Identifying insect pests in museums and heritage buildings

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Contents

Introduction to pest identification

Scope

This booklet is designed to allow practical identification of pest insects and some insects which are environmental indicators Museums and other heritage buildings in the British Isles, as part of IPM pest monitoring, some commonly encountered non-insect arthropods (springtails, spiders, woodlice, etc.) are also included.

Definitions

Pest – a kind of insect which has the potential to damage museum collections by eating or soiling objects or labels, or to provide a nuisance or health hazard to museum staff and visitors.

Environmental indicator – a kind of insect which lives in environmental conditions (e.g. temperature/humidity) that are unsuitable for collections, and whose presence can be used to infer unsuitable conditions for collections.

There is some overlap between what is a pest and an environmental indicator since some pests, e.g. silverfish, can be used to infer that environmental conditions are unsuitable.

A practical approach to identification

While there are about 20,000 species of insect in Britain, only about 40 species are Museum pests in the UK. This means that traditional complicated identification keys are not necessary and pest species can be recognised by simple aspects of their appearance, such as size, shape, colour, form of the antenna, etc., and it is possible to learn the common types fairly quickly.

This booklet allows for the recognition of major groups: beetles, moths, booklice, silverfish and others, and then matching with known pest species.

Mostly the features necessary for identification can be seen on specimens stuck on sticky traps. With experience a good hand lens and good lighting should be sufficient to identify most pests; a binocular microscope is helpful but not essential. However not all specimens will be identifiable.

Where known, the habitat, feeding habits and type of damage can also give a clue to the type of pest since different pests prefer to eat different things and feed in different ways.

It is advisable to form a small reference collection containing the representative specimens of the pest species occurring locally to compare unknown insects against. Ideally these will be verified by an expert.

Keeping up to date

Pests can change status over time, and new pests will colonise the British Isles, so species not included in this booklet will be found in future. Do refresh your knowledge periodically and keep in touch with fellow IPM reps. For example termites and carpenter ants are not yet a problem in UK Museums but may well become so as climate change progresses.

Further study

References are included at the end for further study if desired but are not essential.

Quick photographic reference for pest beetles, beetle larvae and moths

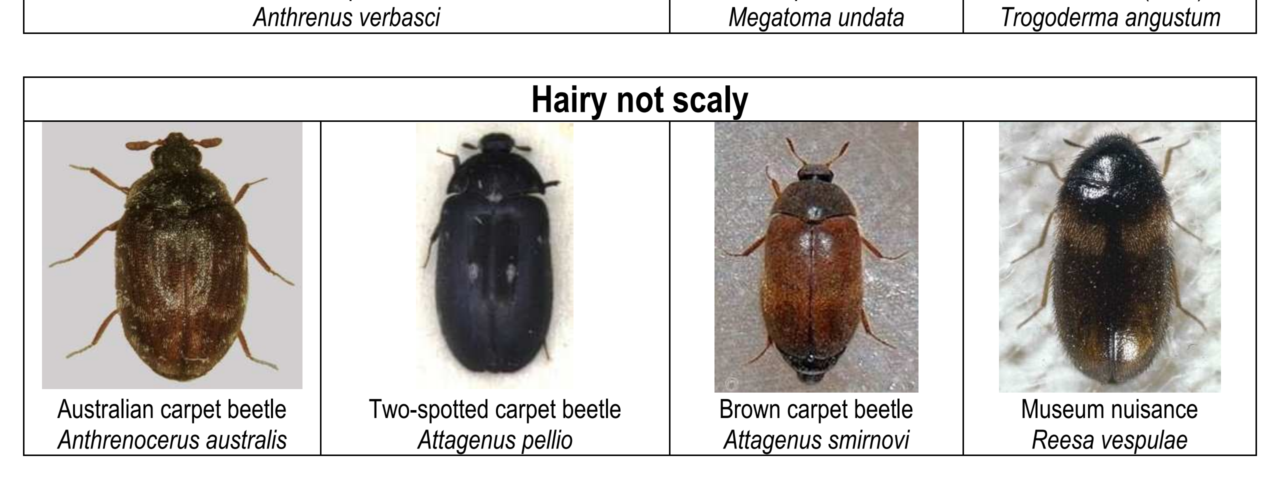
Carpet beetles

Vari-coloured scales, NB scale shape for *Anthrenus* species

A carpet beetle *Anthrenus fuscus*	Guernsey carpet beetle *Anthrenus sarnicus*

Varied carpet beetle *Anthrenus verbasci*	A carpet beetle *Megatoma undata*	Berlin beetle (male) *Trogoderma angustum*

Hairy not scaly



Australian carpet beetle *Anthrenocerus australis*	Two-spotted carpet beetle *Attagenus pellio*	Brown carpet beetle *Attagenus smirnovi*	Museum nuisance *Reesa vespulae*

Carpet Beetles (continued)

Atypical with larva like female and slender male



Female male

Odd beetle

Thylodrias contractus

Hide beetles



Larder beetle

Dermestes lardarius

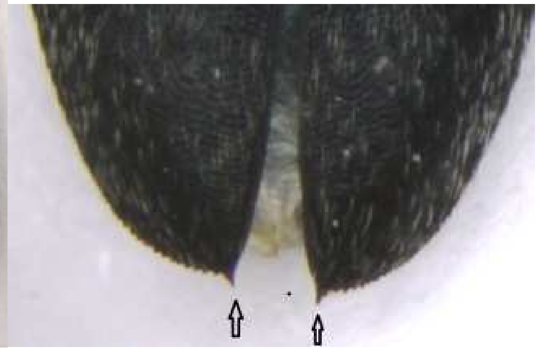


Peruvian hide beetle

Dermestes peruvianus







Hide beetle - upper, under and wing case tips

Dermestes maculatus

Carpet beetle and Hide beetle larvae

<table>
<tr><th colspan="3">Stout, body bristly, large dense short tail tufts</th></tr>
<tr><td>
Guernsey carpet beetle
Anthrenus sarnicus</td><td>
Varied carpet beetle
Anthrenus verbasci</td><td>
A carpet beetle (skin)
Megatoma undata</td></tr>
<tr><td colspan="2">NB Anthrenus larvae of all kinds are best recorded as Anthrenus sp.</td><td></td></tr>
</table>

<table>
<tr><th colspan="3">Moderately elongate, bristly body, long tail hairs
NB for identification purposes these are best recorded as Anthrenocerus/Trogoderma/Reesa sp.</th></tr>
<tr><td>
Australian carpet beetle
Anthrenocerus australis</td><td>
Berlin beetle
Trogoderma angustum</td><td>
Museum nuisance
Reesa vespulae</td></tr>
</table>

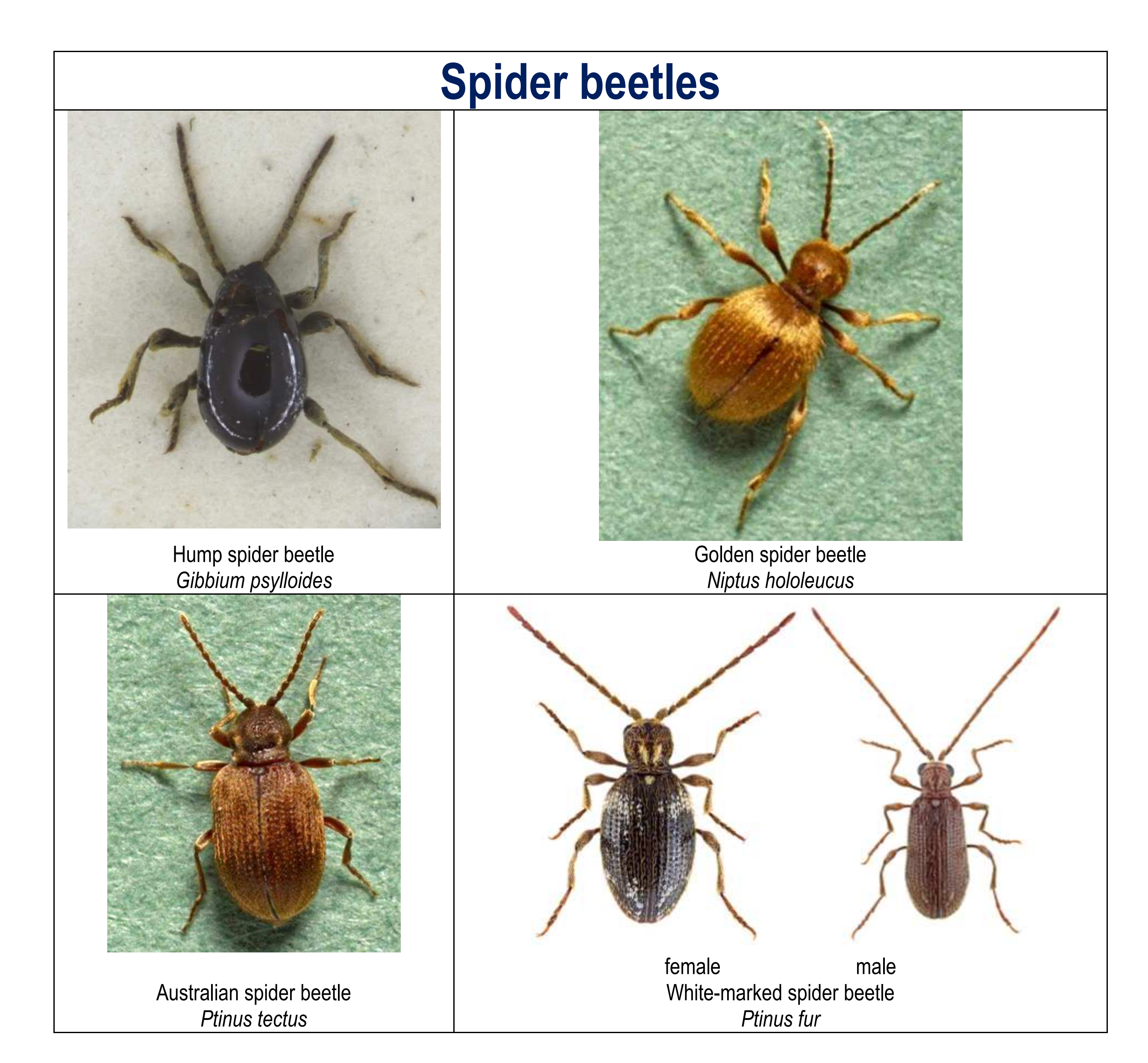
<table>
<tr><th colspan="2">Torpedo shaped - body not bristly
NB record all as Attagenus sp.</th></tr>
<tr><td>
Two-spotted carpet beetle
Attagenus pellio</td><td>
Brown carpet beetle
Attagenus smirnovi</td></tr>
</table>

Carpet beetle and Hide beetle larvae (continued)

Row of hairs like eye-lashes
 Odd beetle *Thylodrias contractus*

Large, dark, bristly, two tail horns (urogomphi) **NB record all as *Dermestes* sp.**
 Hide beetles *Dermestes* sp.

Spider beetles



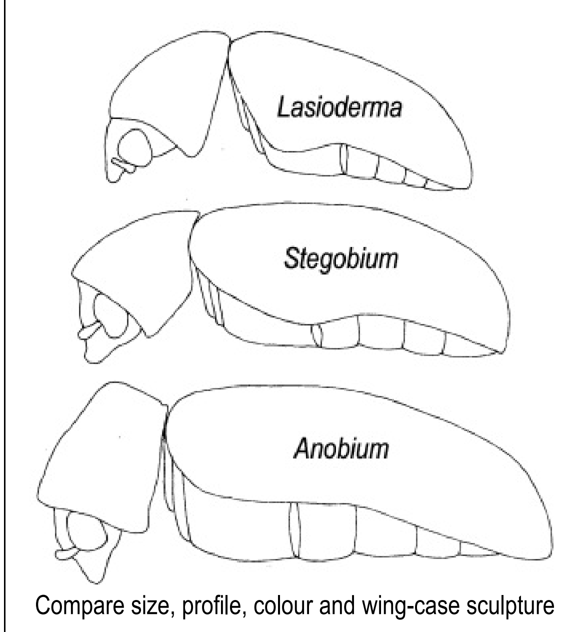
Hump spider beetle
Gibbium psylloides

Golden spider beetle
Niptus hololeucus

Australian spider beetle
Ptinus tectus

female male
White-marked spider beetle
Ptinus fur

Furniture beetle, Biscuit beetles and allies



Compare size, profile, colour and wing-case sculpture



Cigarette beetle
Lasioderma serricorne



Biscuit beetle
Stegobium paniceum

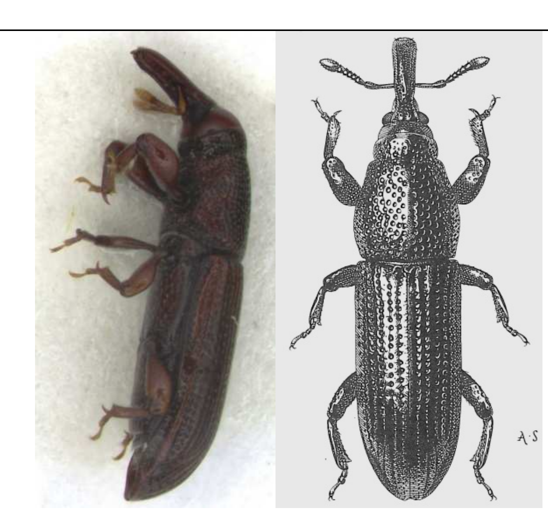
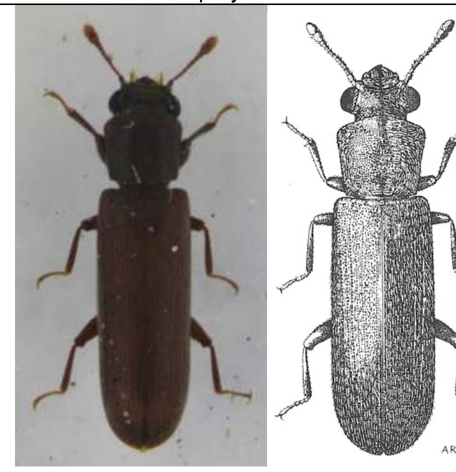


Furniture beetle
Anobium punctatum



Death watch beetle
Xestobium rufovillosum

Beetles - other wood-boring beetles

 Bamboo borer *Dinoderus minutus*	 Wet wood weevil *Euophryum confine*
 House longhorn beetle *Hylotrupes bajulus*	 Powder-post beetle *Lyctus brunneus*



Wharf borer
Nacerdes melanura

Moths

 Brown house moth *Hofmannophila pseudospretella*	 Yellow-backed clothes moth/Pale-backed clothes moth *Monopis* spp.
 White-shouldered house moth *Endrosis sarcitrella*	 Case-bearing clothes moth *Tinea pellionella*
 Indian meal moth *Plodia interpunctella*	 Webbing clothes moth *Tineola bisselliella*
 Tapestry moth *Trichophaga tapetzella*	

Beetle pests and environmental indicators

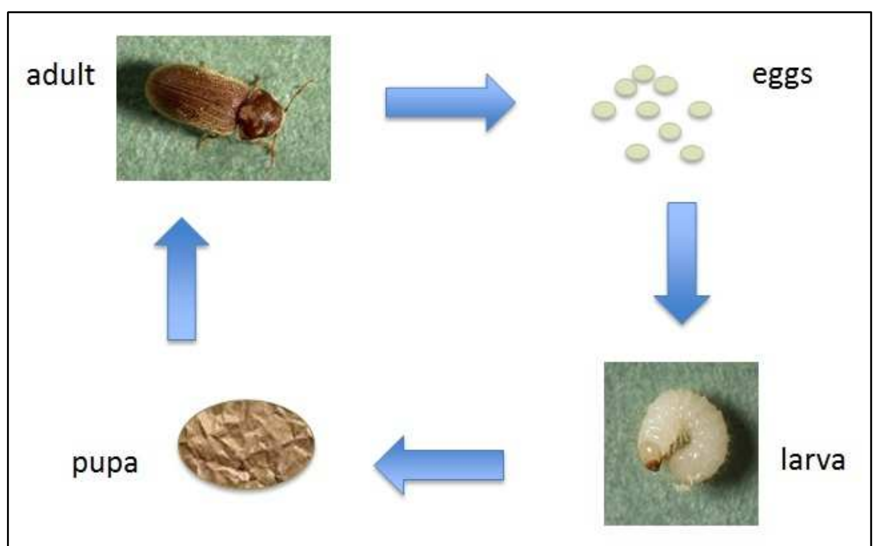
Order Coleoptera

Beetles are winged; the first pair of wings (elytra or wing cases) is hardened and shell-like, and close over the hind wings protecting them. The body is usually sturdy and compact with a hard shell. Shape is generally oval, or for wood borers, more or less cylindrical or parallel sided. Six legs are well developed and the antennae vary in shape but are often short and clubbed. Museum pests and environmental indicator species are mostly small to medium sized. Body length: 1.5-15 mm. Some non-pest species may enter buildings occasionally (see non-pest insects below).

Adult beetles.



The life cycle has four stages: egg, larva (or grub), pupa and adult beetle.



The larvae can be free-living e.g. the bristly larvae 'woolly bears' of carpet beetles, or barely mobile grubs for species which live inside wood or other plant material. The latter are rarely seen on traps.



Australian carpet beetle - *Anthrenocerus australis*

Identification: adult

Shape: rounded.

Colour: dark brown to reddish brown and wing cases each with four weak bands of white hairs.

Antennae: short, with a compact club.

Body length 2.5-3 mm.

Similar species: *Anthrenusis* are similar but *Anthrenocerus* has hairs not scales on wing cases.



Anthrenocerus australis adult

Identification: larva

Larvae have long hairs on the body, short brushes of hairs on the last few tail segments and a long tuft of hairs at the hind end of the body.

Larvae of *Anthrenocerus* are less stout and have smaller brushes of hairs than *Anthrenus* and are not as elongate as *Attagenus* which have no brushes of hairs.

The larvae of *Anthrenocerus australis*, *Reesa vespulae* and *Trogoderma angustum* are hard to distinguish without microscopic examination, and need to be referred to an expert, or confirmed from adults in the same infestation.



Anthrenocerus australis larva

Signs of damage

The larvae will eat wool fur, feathers and other animal proteins and their products, also bird nests, and have been often found in wool fluff and food detritus under floor boards.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.



Anthrenocerus australis larval skin, feeding damage and frass on wool textile

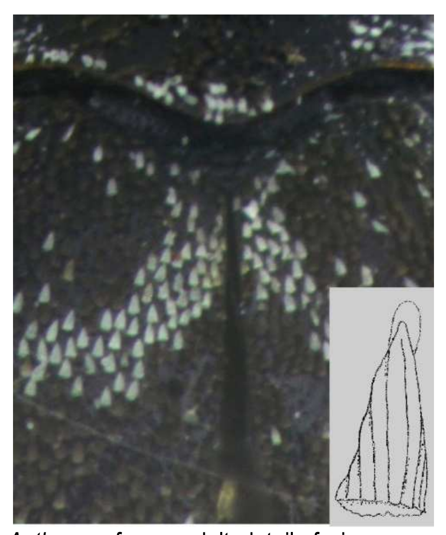
Status

Not usually outdoors, a minor pest in Britain in commercial and domestic buildings. An introduced species (1933) now increasing. Similar food preferences to other carpet beetles and ability to live inside buildings, suggest it has potential to become a more serious pest.

A carpet beetle - *Anthrenus fuscus*



Anthrenus fuscus adult



Anthrenus fuscus adult, detail of wing cases, showing
triangular scale shape, inset is a single scale

Identification: adult

Shape: rounded.

Colour: usually dark with minute scales which are predominantly black, with some white scales forming an ill-defined pattern.

Antennae, short, clubbed.

Body length 1.7-2.8 mm.

Similar species: the three *Anthrenus* species presented here may be distinguished by the shape of the scales under high magnification, narrow triangular in *A. fuscus*, broad triangular in *A. sarnicus* and petal shaped in *A. verbasci.* Compared to *A. verbasci, A. fuscus* is typically small and dark, and *A. sarnicus* large and pale.

Other carpet beetles with scales have a more elongate body shape, than the *Anthrenus* species.

Identification: larva

Anthrenus larvae are short and stout with long body hairs and conspicuous brushes of hair on the last few segments. Identification to species is difficult and requires microscopic examination.

For recording purposes larvae are best referred to as *Anthrenus* sp. and confirmed from associated adults.

Signs of damage

Larvae eat wool, fur, feathers, dead insects, and live in spider webs, the nests of insects and mammals, in out buildings and sheds.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

May be a useful indicator of poor building hygiene such as bird nests, and dirty attics and outbuildings.

Status

Not usually a pest indoors, living mostly outside/unheated outhouses, or attics, although it is commonly found around and often enters buildings. Most likely to be a pest in poorly heated, humid buildings.

Guernsey carpet beetle - *Anthrenus sarnicus*

Identification: adult

Shape: rounded.

Colour: black with a pattern of minute white, reddish-brown and black scales.

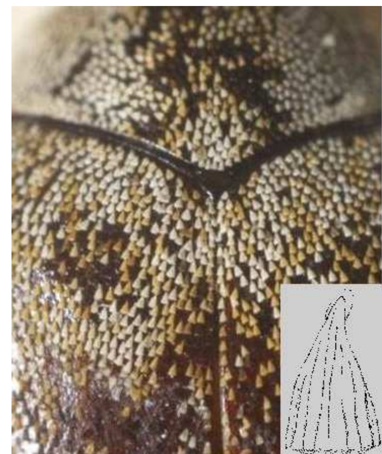
Antennae: short clubbed.

Body length 2.6-3.2 mm.

Similar species: the three *Anthrenus* species presented here may be distinguished by the shape of the scales under high magnification, narrow triangular in *A. fuscus*, broad triangular in *A. sarnicus* and petal shaped in *A. verbasci.* Compared to *A. verbasci, A. fuscus* is typically small and dark, and *A. sarnicus* large and pale. Other carpet beetles with scales have a more elongate body shape, than the *Anthrenus* species.



Anthrenus sarnicus adult



Anthrenus sarnicus, detail of wing cases, with triangular scales, inset is a single scale

Identification: larva

Anthrenus larvae are short and stout with long body hairs and conspicuous brushes of hair on the last few segments. Identification to species is difficult and requires microscopic examination, although *Anthrenus sarnicus* is generally a paler, more honey colour than *Anthrenus verbasci* which is more reddish brown.

For recording purposes larvae are best referred to as *Anthrenus* sp. and confirmed from associated adults.



Anthrenus sarnicus larvae

Signs of damage

The larvae will eat bird and mammal skins, insect specimens, wool and silk textiles.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.



Anthrenus sp. larval skins, frass and feeding damage on a tortoise specimen

Status

An introduction to Britain (1963), now widespread and common in some museums, where it can be a serious pest. It appears to be replacing *Anthrenus verbasci*, possibly because of its more rapid life cycle and interspecific predation.

Varied carpet beetle - *Anthrenus verbasci*

Identification: adult

Shape: rounded.

Colour: black with a pattern of minute black, white and reddish-brown scales.

Antennae: short clubbed.

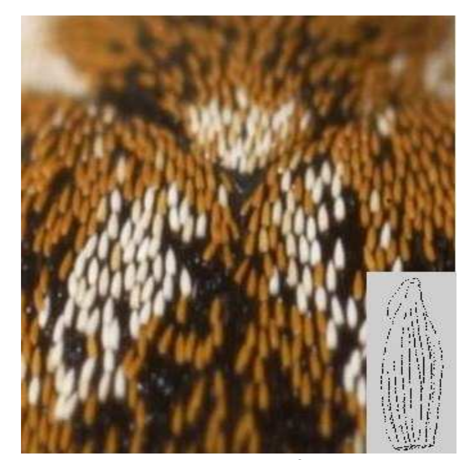
Body length1.7-3.2 mm.

Similar species: the three *Anthrenus* species presented here may be distinguished by the shape of the scales under high magnification, narrow triangular in *A. fuscus*, broad triangular in *A. sarnicus* and petal shaped in *A. verbasci.* Compared to *A. verbasci, A. fuscus* is typically small and dark, and *A. sarnicus* large and pale.

Other carpet beetles with scales have a more elongate body shape, than the *Anthrenus* species.



Anthrenus verbasci adult



Anthrenus verbasci adult, detail of wing cases, showing triangular scale shape, inset is a single scale

Identification: larva

Anthrenus larvae are short and stout with long body hairs and conspicuous brushes of hair on the last few segments. Identification to species is difficult and requires microscopic examination, although *Anthrenus sarnicus* is generally a paler, more honey colour than *Anthrenus verbasci* which is more reddish brown.

For recording purposes *Anthrenus* larvae are best referred to as *Anthrenus* sp. and confirmed from associated adults.



Anthrenus verbasci larvae

Signs of damage

Materials damaged: bird and mammal skins, insect specimens, wool textiles and animal glue.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status

A long established and common pest species, living inside and outside buildings in Britain, although it appears to have declined where *Anthrenus sarnicus* has become established.



Anthrenus verbasci larvae, feeding damage on wool textile.

Two-spotted carpet beetle - *Attagenus pellio*
Other name: Fur beetle


Attagenus pellio adult


Attagenus pellio larva


Attagenus pellio larvae

Identification: adult
Shape: oval.

Colour: black with a spot of white scale-like hairs on each wing case (hence the common name) and three more such white spots on the thorax.

Antennae: short, clubbed.

Body length 4.5-5.5 mm.

Similar to *Attagenus smirnovi* but easily distinguished by colour.

Identification: larva
Larvae are torpedo shaped, the body hairs are short and there is a long tail tuft, but no short brushes on the last few tail segments.

Other *Attagenus* species very similar and for recording purposes it is best to refer to them as *Attagenus* sp., and confirm the identification from associated adults.

Signs of damage
The larvae will eat wool, fur, feather, silk, animal skins and cereals.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status
Widespread, and common in southern Britain, both indoors and out, and an established pest in commercial and domestic buildings.

Brown carpet beetle - *Attagenus smirnovi*

Other name: Vodka beetle –not recommended - there is no association with vodka, it is named after a man called Smirnov, not the vodka Smirnoff)

Identification: adult

Shape: oval.

Colour: head black to brown, usually distinctly darker than the lighter brown to yellowish-brown wing cases.

Antennae: short, clubbed, the male antenna has a long sausage-shaped club.

Body length 2-5 mm.

The wing cases have fine dense hairs which distinguish *Attagenus smirnovi* from scaled *Anthrenus* species, and from *Reesa vespulae* which has coarser, more upstanding hairs. *Attagenus unicolor,* the Black carpet beetle, is rare in Britain but very similar, usually darker and with the thorax and head the same shade. It has similar habits to *A. smirnovi* and the potential to be a pest, so if suspected seek expert confirmation.



Attagenus smirnovi adult

Identification: larva

Larvae are torpedo shaped dark brown with reddish brown hairs. The body hairs are short and there is a long tail tuft, but no short brushes on the last few tail segments. Larvae of other *Attagenus* species are very similar and are best recorded as *Attagenus* sp., and the identification confirmed from associated adults.



Attagenus smirnovi larvae

Signs of damage

Materials damaged: bird and mammal skins, insect specimens and wool textiles, also dried plants and seeds. Often found in dust bunnies, which can accumulate in dead spaces in museum galleries and stores – dust bunnies are usually made up of hair, textile fibre, and human skin flakes. Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins. The adults are active fliers and attracted to lights, and can be detected by examining light fittings or windowsills.



Attagenus smirnovi larval skins in a dust bunny which supported a significant infestation

Status

A recent introduction (1978) now well established in England in domestic premises and museums and a significant and increasing pest.

A carpet beetle - *Megatoma undata*



Megatoma undata adult



Megatoma undata larval skin

Identification: adult

Shape: elongate oval.

Colour: black with distinctive and bold pattern of white scales, forming two zig-zag bands on each wing case, and three spots on the thorax.

Antennae short, strongly clubbed.

Body length 3.6-5.0 mm.

Superficially similar to *Trogoderma angustum* but easily distinguished by the larger size and brighter pattern, which is formed by scales rather than hairs.

Identification: larva

Full grown larvae appear like an oversized *Anthrenus* although a little more elongate. *Megatoma* larvae have distinct black bands across the front of the first three segments, even visible in the larval skin pictured here.

Signs of damage

This species is normally found under the bark of dead trees and on walls, barn, in association with nests and burrow of other insects and spiders. The specimen pictured here was reared from a nest of the Red mason bee *Osmia bicornis.* There is a recorded instance where an insect collection in a domestic building was attacked; the building had mason bee nest boxes outside, which may have been the source of the infestation.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status

A widespread species normally found outdoors and not usually associated with buildings, only rarely a pest.

Museum nuisance - *Reesa vespulae*

Other names: American wasp beetle

Identification: adult

Shape: oval.

Colour: black to dark brown with an oblique light reddish mark near the base of the wing cases.

Antennae: short, weakly clubbed.

Body with long hairs.

Size 2-4 mm.

Reesa vespulae is superficially similar to *Attagenus smirnovi* but can be distinguished by the colour pattern and longer more upstanding hairs, which give *Reesa* a more shaggy appearance.



Reesa vespulae adult

Identification: larva

Larvae have long hairs on the body, short brushes of hairs on the last few tail segments and a long tuft of hairs at the hind end of the body. *Reesa* larvae are less stout and have smaller brushes of hairs than *Anthrenus* species and are not as elongate as *Attagenus* species which have no brushes of hairs. The larvae of *Anthrenocerus australis*, *Reesa vespulae* and *Trogoderma angustum* are hard to distinguish without microscopic examination and need to be referred to an expert of identification is required, or confirmed from adults in the same infestation.



Reesa vespulae larvae

Signs of damage

Materials damaged: Insect specimens can be damaged severely, larvae can thrive in fluff under insect cabinets, also vegetable material especially seeds. Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins. Males not needed for reproduction, females reproduce without fertilization, so one larva entering a drawer of insects can start a colony which entirely destroys the contents. Adults are active fliers and come to light, and can be found in light fittings or on windowsills.



Reesa vespulae frass and larval skins – the dung beetle has been hollowed out.

Status

A recent introduction (1997) uncommon, mainly indoors or close to buildings, but now widespread and increasing. A severe pest of entomology collections in museums.

Berlin beetle - *Trogoderma angustum*
Other name: Stockholm beetle

Identification: adult
Shape: body elongate, males parallel sided, the females slightly widened behind.

Colour: dark, elytra can be red marked, each with three distinct bands of white.

Antennae: short, weakly clubbed.

Body length 2-4 mm.

Body is more elongate than most other carpet beetles.


Trogoderma angustum adult male

Identification: larva
Larvae have long hairs on the body, short brushes of hairs on the last few tail segments and a long tuft of hairs at the hind end of the body.

Trogoderma larvae are less stout and have smaller brushes of hairs than *Anthrenus* species and are not as elongate as *Attagenus* species which have no brushes of hairs.

The larvae of *Anthrenocerus australis*, *Reesa vespulae* and *Trogoderma angustum* are hard to distinguish without microscopic examination and need to be referred to an expert of identification is required, or confirmed from adults in the same infestation.


Trogoderma angustum larvae and skins

Signs of damage
Materials damaged: herbarium specimens, including flowering plants and mycological specimens; bird mounts.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status
First recorded in Scotland (1998) and England (2000), now an established pest but still uncommon.


Trogoderma angustum larval damage - a slime mould specimen with larvae and cast skin.

Odd beetle - *Thylodrias contractus*

Identification: adult

This species belongs to the carpet beetle family but has an unusual appearance hence the common name Odd beetle.

Shape: the females are wingless, superficially resembling a carpet beetle larva, but have a uniform covering of short soft hairs instead of bristle tufts. The males look more like beetles but compared to other carpet beetles are slender, delicate and have long spindly legs.

Colour: yellowish brown (females), brown with yellowish brown wing cases and legs (male).

Antennae: short, unclubbed (female), long, unclubbed (male).

Body length 2-5 mm (female), 2-3 mm (male).

Pictures show wingless female above and winged males below.



Thylodrias contractus female



Thylodrias contractus males

Identification: larva

The larva has a very distinct appearance; each segment has a neat row of hairs, giving the appearance of a set of false eyelashes!



Thylodrias contractus larval skin

Signs of damage

Materials damaged: herbarium specimens.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Because of the distinctive bristles, even badly damaged larvae or larval skins (pictured) are easily recognisable on sticky traps.

Status

Rare in Britain usually only seen as an import, but one long standing colony is established in the herbarium of the Natural History Museum, London.

Larder beetle - *Dermestes lardarius*


Dermestes lardarius adults

Identification: adult
Shape: narrow oval.

Colour: body black, the base of the wing cases has a pattern of greyish hairs.

Antennae: short with a compact club.

Other characters: the end of each wing case does not have a spine (compare *Dermestes. maculatus*).

Body length 7-9 mm.


Dermestes sp. larva, all *Dermestes* larvae are similar

Identification: larva
Dermestes larvae are black, bristly and have a pair of stout curved spikes on the tail. Larvae are hard to identify to species without detailed microscopic examination, and best recorded as *Dermestes* sp. unless confirmed by associated adults.

Signs of damage
The larvae naturally eat carcasses whether moist or dry, leaving only bones, also stored meat products hence the name larder beetle, and in museums, animal specimens and artefacts, occasionally on vegetable material.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status
A serious pest in warehouses and food premises, and a minor household pest.

Hide beetle - *Dermestes maculatus*

Identification: adult
Shape: elongate oval.

Colour: black, wing cases uniformly dark, sides of thorax with a border of greyish hairs. The underside has whitish hairs.

Antennae: short, with compact club.

Other characters: the end of each wing case has a spine.

Body length 5.5-10 mm.

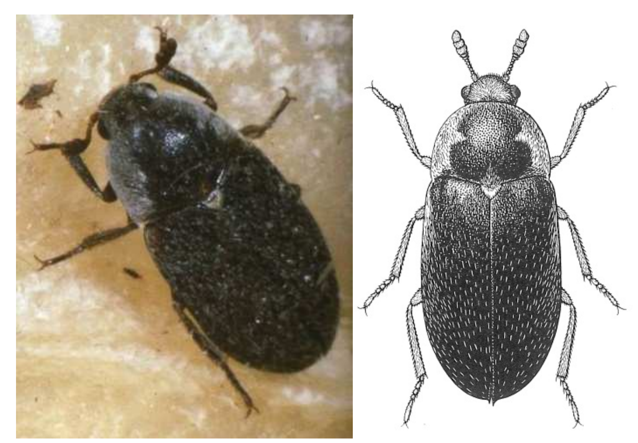
Pictures show two views from above, underside showing whitish hairs, and spines on tip of wing cases.

Identification: larva
Dermestes larvae are black, bristly and have a pair of stout curved spikes on the tail. Larvae are hard to identify to species without detailed microscopic examination, and best recorded as *Dermestes* sp. unless confirmed by associated adults.

Signs of damage
The larvae naturally eat carcasses whether moist or dry, leaving only bones, also stored meat products hence the name larder beetle, and in museums, animal specimens and artefacts, occasionally on vegetable material. Larvae may attack the carcasses of rodents which have died in undisturbed places in buildings. This species is used in zoology museums for defleshing skeletons – of course these cultures must be kept well separate from zoology collections!

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status
A serious pest on animal products in commercial premises, not a household pest.



Dermestes maculatus adults



Dermestes maculatus adult, underside and tip of wing cases showing spines



Dermestes maculatus dried larva; and hind body with two spikes



Dermestes sp. larvae which have eaten a dead rat carcass.

Peruvian hide beetle - *Dermestes peruvianus*

Identification: adult

Shape: elongate oval.

Colour: uniformly dark, thorax and underside of body with fine golden hairs.

Antennae: short, with compact club.

Other characters: the end of each wing case does not have a spine (compare *Dermestes. maculatus*).

Body length 7-9 mm.

Identification: larva

Dermestes larvae are black, bristly and have a pair of stout hooks on the tail. Larvae are hard to identify to species without detailed microscopic examination. The larva of *D. peruvianus* is similar to that of *D. maculatus* figured above.

Signs of damage

Materials damaged: The larvae naturally eat carcasses and stored/waste meat products, occasionally vegetable material.

Signs of infestation are neatly chewed holes, frass and cast larval skins. Each larva produces several skins as it moults. Larval features are often visible on the larger larval skins.

Status

An introduced species (1954) now established and the commonest *Dermestes* in domestic premises.



Dermestes peruvianus adult



Dermestes peruvianus adult



Dermestes peruvianus breeding site in accumulated food residue behind kitchen unit

Hump spider beetle - *Gibbium psylloides*

Other names: This species has been confused with *Gibbium aequinoctiale* and the names Smooth spider beetle and Shiny spider beetle are best avoided as both names have been used for both species at various times)



Gibbium psylloides adult

Identification: adult

Shape: body droplet shaped, humped, with head hidden under thorax, and long legs, giving a spider like appearance.

Colour: dark brown beetle legs and antennae covered in yellowish scales

Antennae: long, unclubbed.

Other characters: wing cases polished, very shiny, with no pits or lines.

Body length 2.5 mm.

This species has often been confused with *Gibbium aequinoctiale* from which it may be separated only by microscopic examination. For recording purposes it should be referred to as *Gibbium* sp. unless confirmed by an expert.

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage

The larvae will eat a wide range of vegetable and animal materials, stored food products, and have even been known to attack Egyptian mummies.

Signs of infestation are the holes and frass made by the larva. Larvae are not usually visible as they feed concealed in the food. They form a globular cocoon for pupation, and may bore into and damage nearby materials when preparing pupation sites.

Status

A stored product pest in buildings, this species is an uncommon introduction to Britain, occasionally establishing itself.

Golden spider beetle - *Niptus hololeucus*


Niptus hololeucus adult

Identification: adult
Shape: body narrowed between head and thorax, globular hind body, head hidden under thorax and long legs give it spider like appearance

Colour: body brown, densely covered with a mixture of small golden scales and longer outstanding golden hairs.

Antennae: long, unclubbed.

Body length 3-4 mm.

Identification: larva
The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage
Materials damaged: the larvae will eat a wide range of both dried animal and plant material, including stored products, scavenging in rodent nests and droppings in buildings, and attacking a range of museum specimens and organic artefacts.

Signs of infestation are the holes and frass made by the. Larvae are not usually visible as they feed concealed in the food.

Status
Widespread and established, warehouses and domestic buildings, more of a scavenger than a major stored product pest.

White-marked spider beetle - *Ptinus fur*

Identification: adult

Shape: narrow, the male almost parallel side, the female more rounded. The body is narrowed between head and thorax, and with long legs giving a spider like appearance.

Colour: brown, with two tufts of white hairs on the thorax and a variable number of small white hair patches on the wing cases.

Antennae: long, unclubbed.

Other characters: the male has large prominent eyes, has longer antennae and is more slender than the female.

Body length 2.5-4 mm.

This species is more elongate and has longer antennae than the other spider beetles featured here.



Ptinus fur female

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage

The larva feeds on a wide range of vegetable and animal materials, and stored products, and will attack museum collections.

Signs of infestation are the holes and frass made by the larva. Larvae are not usually visible as they feed concealed in the food.

Status

A widely established stored product pest, although less common than its relative *Ptinus tectus*.



Ptinus fur male

Australian spider beetle - *Ptinus tectus*

Identification: adult

Shape. Body narrowed between head and thorax, head hidden under thorax and long legs give a spider-like appearance.

Colour: reddish brown, hairs brown, without contrasting white hairs.

Antennae: long, unclubbed

Body length 3-4 mm.

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage

Materials damaged: will eat both dried animal and plant material, common in buildings especially in attics and bird nests. Will attack a wide range of food products, museum specimens and animal and plant based artefacts.

Signs of infestation are the holes and frass made by the larva. Larvae are not usually visible as they feed concealed in the food.

Status

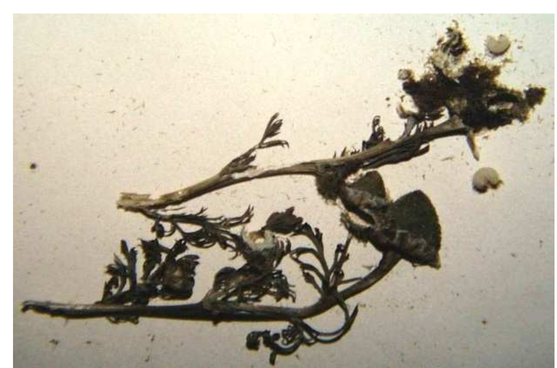
A common and long established pest species in domestic and commercial premises.



Ptinus tectus adult



Ptinus tectus larvae



Ptinus tectus larvae and frass on damaged herbarium sheet.

Furniture beetle - *Anobium punctatum*
Other names: Woodworm

Identification: adult
Shape: narrow, beetles with distinctly humped thorax, and head hidden underneath.

Colour: dull dark grey/brown.

Antennae: short, with slender 3-segmented club.

Body length 3-5 mm.

Anobium punctatum is similar to *Stegobium paniceum* and *Lasioderma serricorne* but are darker and, in side view, have a humped thorax.

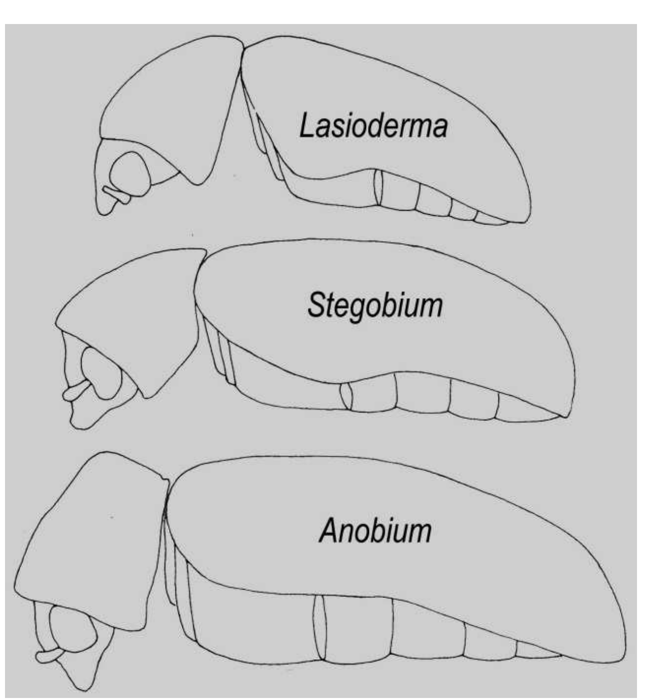
Identification: larva
The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.



Anobium punctatum adult

Signs of damage
Materials damaged: larvae eat sapwood of many hardwoods such as oak and ash, and wood composites such as plywood made with protein based (casein) glues. Wooden artefacts (treen) with unfinished surfaces are more at risk as the female beetle prefers to lay eggs in rough wood. Will also attack books (also known as bookworm), NB similar feeding damage to books may occasionally be caused by *Stegobium paniceum.*

Signs of infestation are the holes and frass released by the adult exiting the wood. Larvae are not usually visible as they feed concealed in the food. Heavy infestations can leave wood honeycombed and crumbly.



Side view in outline of *Lasioderma, Stegobium* and *Anobium* for comparison of thorax shape and proportions.

Status
A serious domestic pest commonly found in wood framed roofs or floor boards/joists.

Cigarette beetle - *Lasioderma serricorne*

Identification: adult

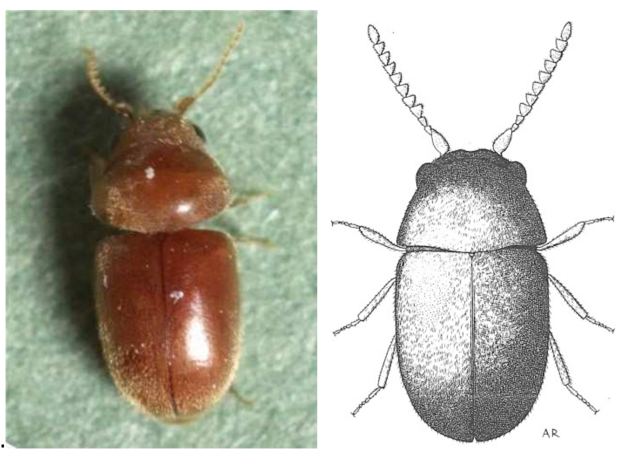
Shape: oval, with distinctly humped thorax, and head hidden underneath.

Colour: reddish brown.

Antennae: uniquely serrate (saw-like)

Body length 2-3 mm.

Lasioderma serricorne is similar to *Anobium punctatum* and *Stegobium paniceum* but have shiny wing cases without obvious lines and saw-like antennae.



Lasioderma serricorne adults

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.



Lasioderma serricorne adult beetles with frass

Signs of damage

The larva will eat dried food, tobacco, plant specimens, freeze dried animal specimens and taxidermy mounts.

Signs of infestation are the holes and frass released by the adult exiting the food. Larvae are not usually visible as they feed concealed in the food.



Larval feeding damage and frass on parrot specimen

Status

This species is a common worldwide stored product pest,

Biscuit beetle - *Stegobium paniceum*
Other names: Drug store beetle, Bread beetle)

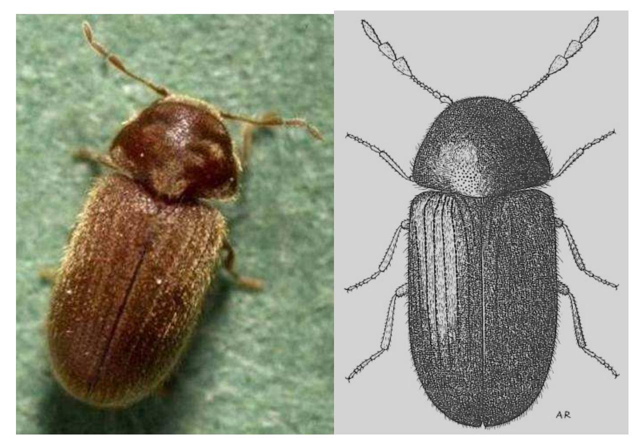
Identification: adult
Shape; elongate oval, with distinctly humped thorax, and head hidden underneath.

Colour: reddish brown.

Antennae: short, with slender 3-segmented club.

Size 2-3 mm body length.

Stegobium paniceum is similar to *Anobium punctatum* and *Lasioderma serricorne* differing from *Anobium* in being reddish brown and not having the thorax humped in side view and from *Lasioderma* in having distinct lines on the wing cases and a weak three segmented antennal club.



Stegobium paniceum adults

Identification: larva
The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.



Stegobium paniceum larva removed from burrow

Signs of damage
Materials damaged: a major stored product pest of seeds, grains and flour, attacking dried food and spices, especially starchy plant specimens, seed heads, papier maché (starch glue) and freeze dried animal specimens. May live in discarded seed/bread in bird nests. Does not feed on wood. Signs of infestation are the neatly chewed exit holes and frass released by the adult exiting the food. Larvae are not usually visible as they feed concealed in the food. The adults are active fliers and attracted to lights, and can be detected by examining light fittings or windowsills.



Stegobium paniceum larval feeding damage to herbarium sheet

Status
This species is a common worldwide stored product pest,



Stegobium paniceum larval feeding damage to manioc root

Death watch beetle - *Xestobium rufovillosum*

Identification: adult

Shape; elongate oval, with distinctly humped thorax, and head hidden underneath.

Colour: dark brown with a mottled pattern caused by golden hairs.

Antennae: short, with slender 3-segmented club.

Body length 5-7 mm.

Most similar in general appearance to *Anobium punctatum,* but easily separated by larger size and golden hairs.

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage

Larvae eat hardwood. Especially oak and elm, which has been damp, especially massive structural timbers in old buildings, where they have become damp, e.g. when socketed into external walls.

Signs of infestation are the large exit holes (c. 3 mm diameter) and coarse rounded frass released by the adult exiting the wood. Larvae are not usually visible as they feed concealed in the food. Timber may become structurally unsound.

The name Death watch comes from the tapping sound made by adult beetles.

Status

A serious and established timber pest in old buildings.



Xestobium rufovillosum adult

Bamboo borer - *Dinoderus minutus*

Identification: adult

Shape: narrow, cylindrical, with distinctly humped thorax, and head hidden underneath.

Colour. black to dark brown

Antennae: short with compact 3-segmented club.

Other characters: wing cases with distinct thimble-like punctures, but not arranged in lines; front of thorax with rough texture like the teeth of a file.

Body length 2.5-3 mm.

Best recorded as *Dinoderus* sp. as other similar species of *Dinoderus* may be found, unless the species is confirmed by an expert.

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage

The larvae usually feed on fresh, starchy wood, particularly bamboo.

Signs of infestation are the holes and frass released by the adult exiting the wood. Larvae are not usually visible as they feed concealed in the food.

Status

Usually occurring as an import from tropical countries.



Dinoderus minutus adults

Wet wood weevil - *Euophryum confine*



Euophryum confine adults

Identification: adult

Shape: elongate cylindrical weevil with distinctive narrow snout, and short legs.

Colour: dark brown to reddish brown

Antennae: short, elbowed, and clubbed.

Other characters: wing cases shiny with small deep pits, the pits in lines.

Body length 2.5-4 mm.

There are three similar wet wood weevils found in Britain: *Euophryum confine*, *Euophryum rufum* and *Pentarthrum huttoni*. They can only be separated by microscopic examination, although *E. confine* is the commonest. For recording purposes it is best to refer to them as *Euophryum/Pentarthrum* sp. unless confirmed by an expert.

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a brown head capsule. It is hard to separate from other such beetle grubs.

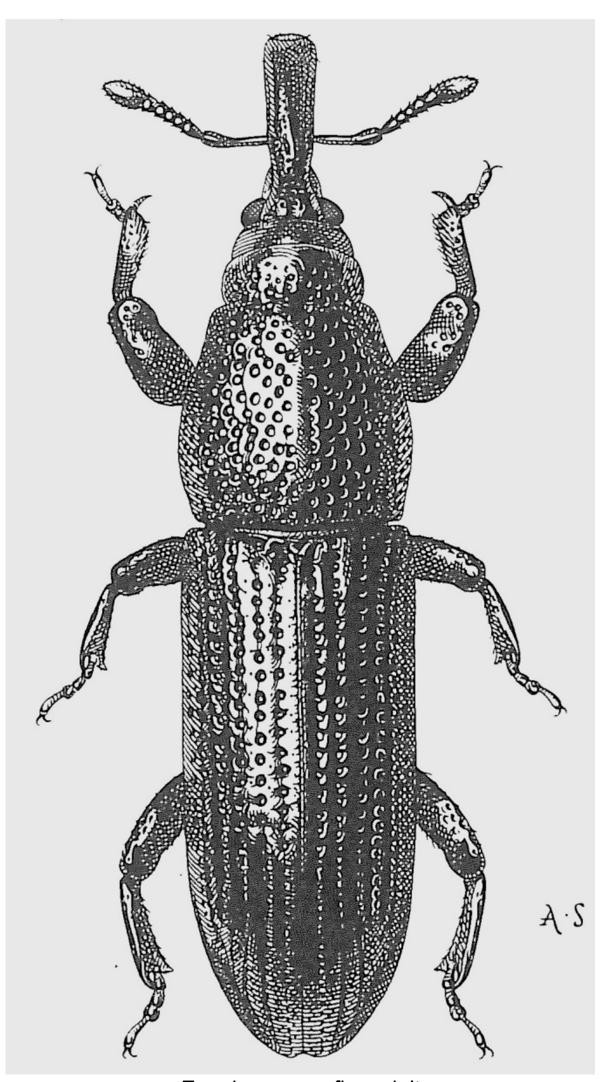
Signs of damage

The larvae attack really damp wood, usually with some fungal decay.

Signs of infestation are the holes (c. 1 mm diameter) and frass released by the adult exiting the wood. Larvae are not usually visible as they feed concealed in the food.

Status

A frequent pest in buildings, however dispersing beetles may be helpful in drawing attention to concealed problems with wet wood.



Euophryum confine adult

House longhorn beetle - *Hylotrupes bajulus*

Identification: adult

Shape: elongate, flattened body, head visible from above, thorax rounded, wing cases parallel sided.

Colour: dark brown to black with grey woolly hairs around thorax and tufts on wing cases.

Antennae: long, unclubbed

Body length 7-25 mm.

Identification: larva

Larva is elongate, flattened, ivory coloured, front end club shaped, and with a small head.

Signs of damage

The larva eats dry coniferous timbers, especially in roof voids and attics.

Signs of infestation are the holes and frass released by the adult exiting the wood. Exit holes are typically oval, reflecting the flattened shape of the larva and adult. Larvae are not usually visible as they feed concealed in the food, but may be detectable by the rasping sounds they make.

Status

An important pest of structural timbers in Europe, established in England, also imported in packing cases which may be the source of infestations.



Hylotrupes bajulus adult

Powder-post beetle - *Lyctus brunneus*

Identification: adult

Shape: elongate, parallel sided, flattened body.

Colour: reddish brown.

Antennae: short, compact club.

Other characters: wing cases with fine grooves.

Body length 3-7 mm.

Identification: larva

The larva is a fat whitish c-shaped hairy grub with a humped thorax and a brown head capsule. It is hard to separate from other such beetle grubs.

Signs of damage

Larvae eat a wide variety of deciduous hardwoods, usually fresh sap wood with high starch/sugar content. Poorly seasoned timber is vulnerable, for example, parquet flooring and wall panels.

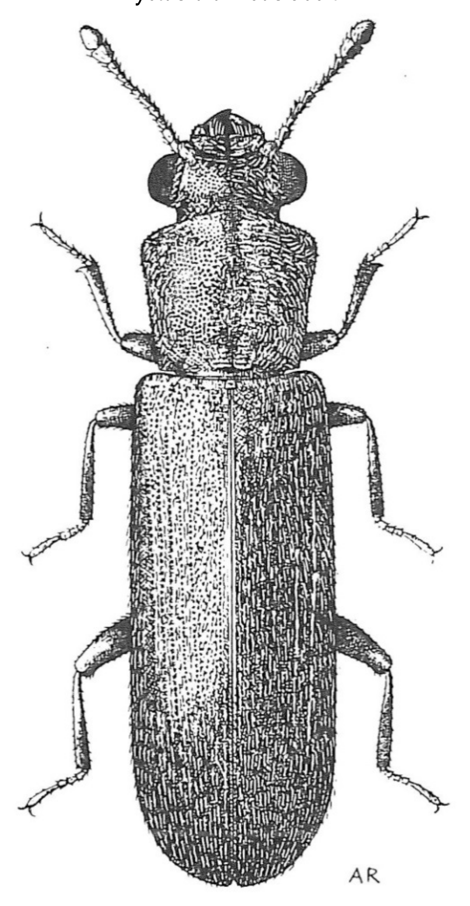
Signs of infestation are the holes (1.5-2 mm diameter) and fine powdery frass released by the adult exiting the wood. Larvae are not usually visible as they feed concealed in the food.

Status

Established infestations are rare, normally introduced from countries with warmer climates.



Lyctus brunneus adult



Lyctus brunneus adult

Wharf borer - *Nacerdes melanura*

Identification: adult

Shape; Elongate, flattened, wing cases more or less parallel sided.

Colour: yellowish brown, covered with fine dense yellow hairs, the tip of the wing cases and the legs black.

Antennae: long, unclubbed.

Body length 8-12 mm.

Similar to some common non-pest soldier beetles, e.g. *Rhagonycha fulva,* but *Nacerdes* can be distinguished by having three lines along each wing case, and four segmented hind tarsi.

Identification: larva

The larva is cylindrical, whitish, with short legs and a stout head capsule. There are constrictions between the body segments and distinct protuberances on some segments.

Signs of damage

The larvae eat saturated wood; usually wharf pilings and ships timbers, but also timber building supports in basements.

Signs of infestation are the holes and frass made when exiting the wood. Larvae are not usually visible as they feed concealed in the food.

Status

Established in Britain, mainly southern and coastal.



Nacerdes melanura adult



Nacerdes melanura larvae

Moth pests and environmental indicators

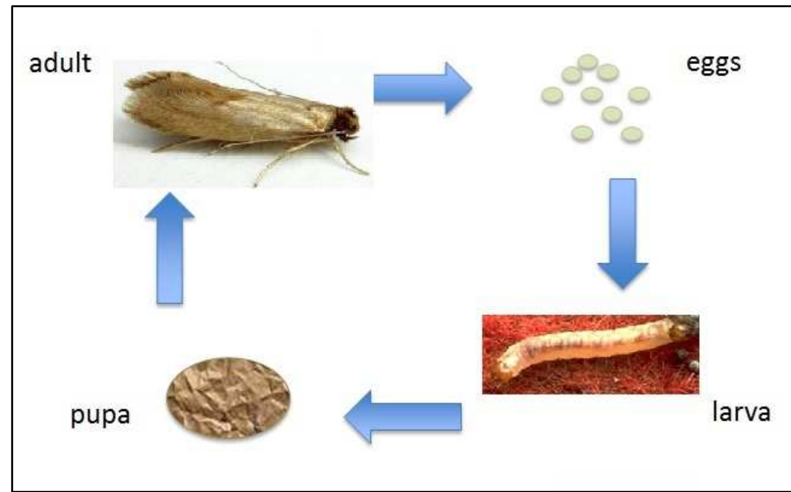
Order Lepidoptera

Moths are winged, with two pairs of wings; the wings are membranous and covered with fine scales which are easily rubbed off. Body usually slender. 6 legs well developed. Antennae long, slender and many segmented, not clubbed. Museum pests and environmental indicator species are mostly small. Larger moths may enter buildings occasionally but are not pests! (see non-pest insects below).

Adult moths



The life cycle has four stages: egg, larva (or caterpillar), pupa and adult moth.



The larvae are small, soft, pale-coloured caterpillars with a brown head capsule, often making silk cases or webbing in which to hide.



White-shouldered house moth - *Endrosis sarcitrella*

Identification: adult
Shape: narrow winged moth, wings normally held flat.

Colour: wings grey, mottled with black, head and front of thorax contrasting white.

Antennae: long, slender, and unclubbed. Palps curved back over the end.

Wingspan 13-20 mm.

Identification: larva
Body soft, whitish, head capsule and plate behind it brown. Very similar to other pest moth larvae and hard to identify to species without detailed microscopic identification.

Signs of damage
The larva will feed on a wide variety of damp dead or decaying animal or plant material, stored cereals, rotten food and paper, dead insects, and detritus in bird nests. In museums protein based material is most at risk, e.g. wool, fur, and feathers, bird and mammals skin, however, they rarely damage clean dry textiles.

Signs of infestation - The larva spins a silken gallery mixed with frass.

This species may indicate poor cleanliness, for example, that bird nests may be present on buildings, or poor humidity control.

Status
A very widespread and established pest in domestic buildings.



Endrosis sarcitrella adult

Brown house moth - *Hofmannophila pseudospretella*

Identification: adult

Shape: narrow winged moth, wings normally held flat.

Colour: wings brown mottled and spotted with black.

Antennae: long, slender, and unclubbed. Palps curved back over the head.

Wingspan 16-25 mm.

Usually somewhat larger than *Tineola bisselliella,* with broader streaked wings.

Identification: larva

Body soft, greyish cream, head capsule reddish brown and plate behind it yellowish. Very similar to other pest moth larvae and hard to identify to species without detailed microscopic identification.

Signs of damage

This species will feed on a wide variety of damp dead animal and plant material, including cotton seeds, grains, dried skins, dead insects including museum specimens, decaying mammal carcasses and refuse in bird nests; however, they rarely damage clean dry textiles.

Signs of infestation - The larva spins a silken gallery mixed with frass.

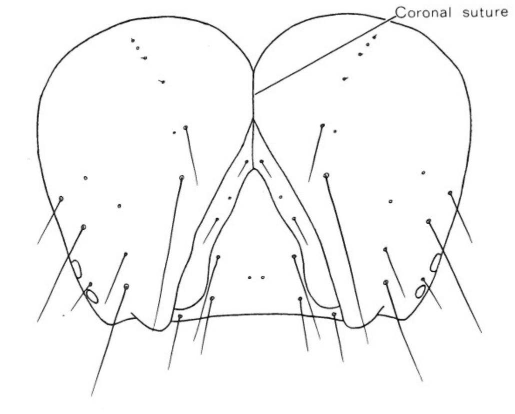
This species may indicate poor cleanliness, for example, that bird nests may be present on buildings, or poor humidity control.

Status

A very widespread and established pest in domestic buildings.



Hofmannophila pseudospretella adult



Hofmannophila pseudospretella larval head capsule

Yellow-backed clothes moth - *Monopis crocicapitella*
Pale-backed clothes moth - *Monopis obviella*

Other names: Obvious moth (*M. obviella)* but this is not a good name as it is very similar to *M. crocicapitella*

Identification: adult

Shape: narrow winged moth, wings normally held around the body.

Colour: wings dark brown with a cream/yellow streak along the hind margin, more or less spotted/mottled with pale marks.

Antennae: long, slender, and unclubbed. Palps inconspicuous.

Wingspan 10-16 mm.

Monopis crocicapitella and *M. obviella* are both variable in colour and only reliably separated by examination of the dissected genitalia. Best recorded as *Monopis* sp., unless identified by a specialist.



Monopis crocicapitella adult from above



Monopis crocicapitella, adult from side

Identification of larva.

The larva of *M crocicapitella* has the body soft, whitish, head capsule brown with margins darkened and plate behind it pale yellow, divided medially. *M. obviella* is probably similar. The larvae are similar to other pest moth larvae and hard to identify to species without microscopic examination.

Signs of damage

These moths will feed on wool, seeds, stored cereal products, bird nests, and the pellets of birds of prey. Larvae are not known to attack museum collections but likely have the potential to become pests because they share a similar food preference to other museum pest moths and are often found around buildings.

This species may indicate poor cleanliness, e.g. that bird nests may be present on buildings.



Monopis adults captured on *Tineola* pheromone trap

Status

Both species are widespread and established in Britain, and are potential museum pests.

Indian meal moth - *Plodia interpunctella*


Plodia interpunctella adult


Plodia interpunctella larva

Identification: adult

Shape: narrow winged moth, wings normally held around the body.

Colour: base of the wing pale buff and the tip contrasting dark reddish/brownish or blackish.

Antennae: long, slender, and unclubbed. Palps forward pointing.

Wingspan 14-20 mm.

Identification: larva

Body soft, yellowish white, pinkish or greenish, head capsule and plate behind it yellowish brown, the head dark marked below. Very similar to other pest moth larvae and hard to identify to species without detailed microscopic identification.

Signs of damage

The larva eats stored grain, dried fruits, nuts, dried roots, herbs and dried insects.

Signs of infestation - It spins a silken web amongst the food, mixed with frass.

Status

Widespread and common, a frequent and abundant warehouse pest, continually reintroduced with imported foodstuff. Less common in museums.

Case-bearing clothes moth - *Tinea pellionella*



Tinea pellionella adult



Tinea pellionella adult

Identification: adult

Shape: narrow winged moth, wings normally held around the body.

Colour: wings covered in silver grey scales with scattered dark scales, forming indistinct spots.

Antennae: long, slender, and unclubbed. Palps inconspicuous.

Wingspan 9–16 mm.

A number of similar *Tinea* species are found in Britain which are only separable by dissection, although *T. pellionella* appears to be the most frequent in buildings.

Identification: larva

Body soft, whitish, head capsule and plate behind it brown. Larvae of *Tinea* species build a characteristic flask shaped cocoon (up to 8 mm long) from fragments of food, which they carry around with them like a caddis-fly case.



Tinea pellionella larva in case

Signs of damage

Larvae will eat wool, hair, fur and feathers, causing great damage to taxidermy mounts, also bird nests, owl pellets and a variety of stored animals products, wool and silk textiles. Signs of infestation are feeding damage, frass, the larger cocoons are obvious but the smaller larvae/cocoons can be hard to detect. This species may indicate poor cleanliness, for example, that bird nests may be present on buildings.

Status

Established in Britain, a significant pests species but much less common than *Tineola bisselliella.*



Tinea pellionella case showing arrangement of fibre



Tinea pellionella feather damage and cases on a bird m

Webbing clothes moth - *Tineola bisselliella*

Identification: adult

Shape: narrow winged moth, wings normally held around the body.

Colour: wings plain, unpatterned buff coloured scales, with a glossy golden sheen. Head reddish brown.

Antennae: long, slender, and unclubbed. Palps inconspicuous.

Wingspan 9-16 mm.

Identification: larva

Body soft, whitish, head capsule it brown and plate behind it barely darkened. Very similar to other pest moth larvae and hard to identify to species without detailed microscopic identification.

Signs of damage

The larva will eat protein based material, e.g. wool, fur, feather, textiles (wool and silk), bird and mammal skins. This species makes a flimsy silk web (hence the English name) over the food, mixed with round frass pellets. The frass is the same colour as the food. When attacking taxidermy they typically feed at the base of the feathers where they are not visible, the extent of the damage only becoming apparent when large areas of plumage fall off.

Status

An abundant and destructive household pest, it has increased greatly in recent years in domestic buildings and museums. It is now the commonest pest species at the Natural History Museum, London.



Tineola bisselliella larval damage - bird mount missing belly feathers.

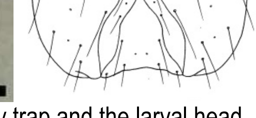


Tineola bisselliella adult



Tineola bisselliella larvae, frass, webs and feeding damage on red wool felt, the dust seal on a display case





Tineola bisselliella larva on a sticky trap and the larval head capsule.



Tineola bisselliella webs on wool carpet.

Tapestry moth - *Trichophaga tapetzella*


Trichophaga tapetzella adult - set specimen - natural resting position is with wings rolled around body

Identification: adult

Shape: narrow winged moth, wings normally held around the body.

Colour: the base of the wing dark brown, the tip of the wing contrasting whitish with a few small black spots. Head white. When resting the colouration gives it the appearance of a bird dropping.

Antennae: long, slender, and unclubbed. Palps inconspicuous.

Body length 15-22 mm.

Identification: larva

Body soft, whitish, head capsule and plate behind it brown. Very similar to other pest moth larvae and hard to identify to species without detailed microscopic identification.

Signs of damage

The larva eats fur, hair, feathers, either naturally in bird nests, or the pellets of birds of prey, or in manufactured items.

Signs of infestation - It feeds in a silken tube amongst the food.

Status

Formerly common in unheated buildings and a widespread, and troublesome pest, but has declined greatly after WW2 and is now quite rare indoors.

Booklice pests and environmental indicators

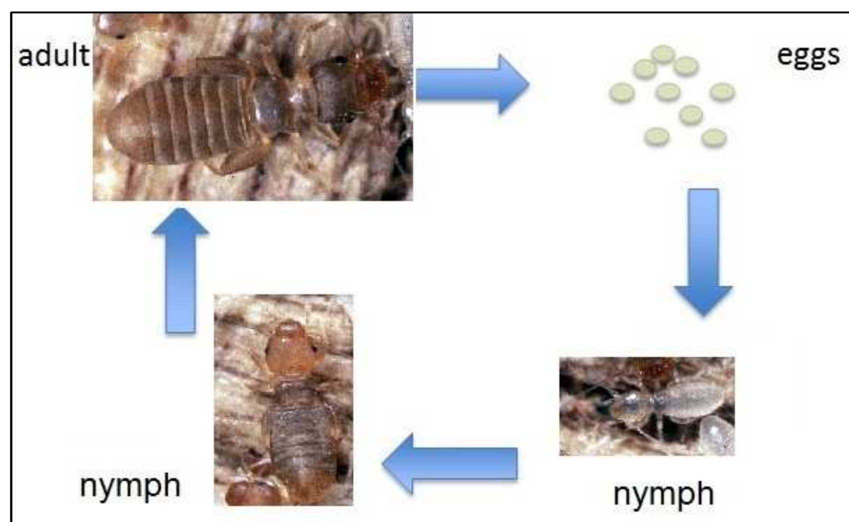
Order Psocoptera

Booklice can be wingless, short-winged or winged, although the species found in museums are usually wingless or short-winged. If they are winged there are two pairs of wings, the wings are membranous and without scales. Body usually stubby, more or less flattened. 6 legs, antennae long slender and many segmented. Museum pests and environmental indicator species are small to minute; the pale-coloured nymphs can be almost invisible to the naked eye. Body length, adults 1-2 mm. Some non-pest species e.g. closely related bark lice which may enter buildings occasionally; however these are usually fully winged (see non-pest insects below).

Adults and nymphs



The life cycle has three stages, egg, nymph and adult. There are no larvae, the nymphs are like small adults but are not sexually mature and never have wings.



A booklouse - *Liposcelis bostrychophila*
Other names: Psocid

Identification: adult
Shape: flattened body, wingless with narrow thorax. Hind femora expanded and basally angled.

Colour: adults light brown, nymphs colourless.

Antennae: long, slender, and unclubbed.

Body length: adults up to 1.5 mm.

Liposcelis species are very hard to identify without slide preparations and microscopic examination. There are a number of species which are found in buildings in Britain, of which *L. bostrychophila* was confirmed at the Natural History Museum, London. Unless there is specialist confirmation it is advisable to record them as *Liposcelis* sp.

A number of other booklouse genera can be found in buildings, such as *Dorypteryx, Lepinotus* and *Trogium. Liposcelis* are distinguished from these other booklice genera by being wingless and having the hind femora (basal segment of the hind leg) greatly thickened and angled near the base.

Identification: nymph
Nymphs are like small pale adults.

Signs of damage
Nymphs and adult booklice will eat papers, glues and other starchy vegetable matter, stored products, and dried insects particularly if slightly damp and mouldy. booklice are named for their habit of living among old books, manuscripts and papers that have lain undisturbed for a while.

Signs of infestation - Larvae and adults scratch and erode the surface of paper, card and insect specimens. Damage can be very subtle as the booklice are so small, but becomes apparent on close examination, becoming more obvious over time.

Squashed bodies may stain papers and encourage further pest attack.

Booklice generally favour areas of high humidity and can be used as an environmental indicator, although *Liposcelis* appear to have a higher tolerance of low humidity than other booklice, and prefer warm temperatures.

Status
Liposcelis are very common but overlooked pests in domestic buildings, warehouses and museum stores.



Liposcelis sp. adult



Liposcelis sp.: adults (darker brown) and various sized nymphs, the smallest are white, the larger ones brown



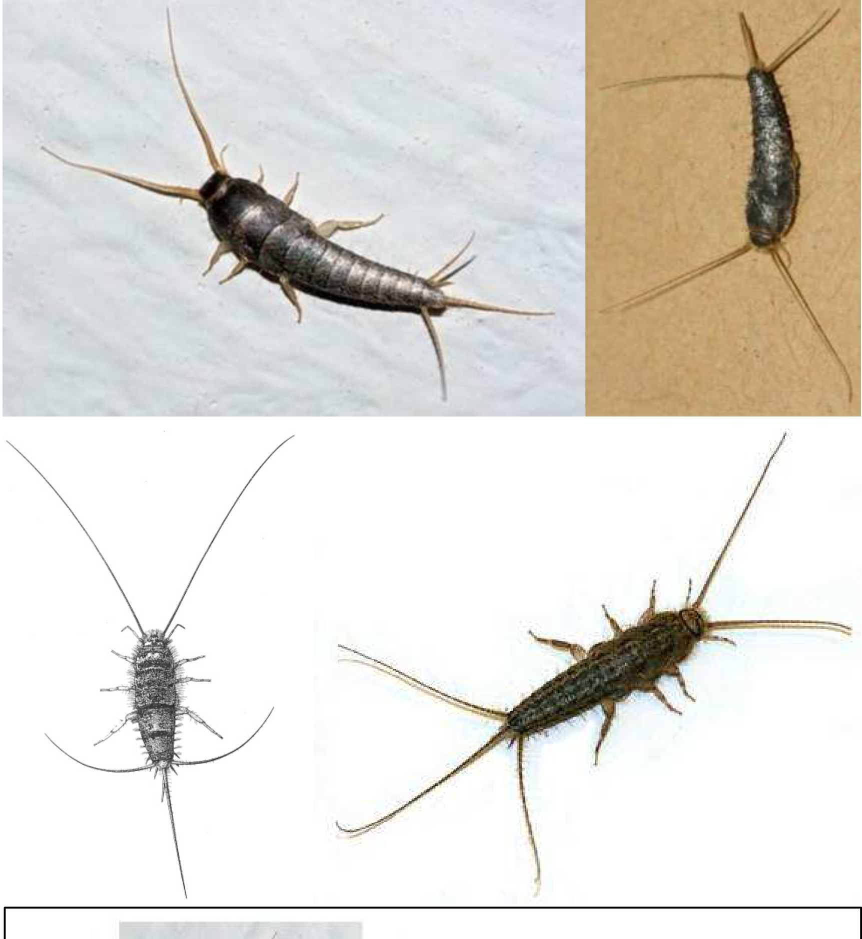
Liposcelis sp., dense infestation causing surface damage to paper.

Silverfish and allied pests

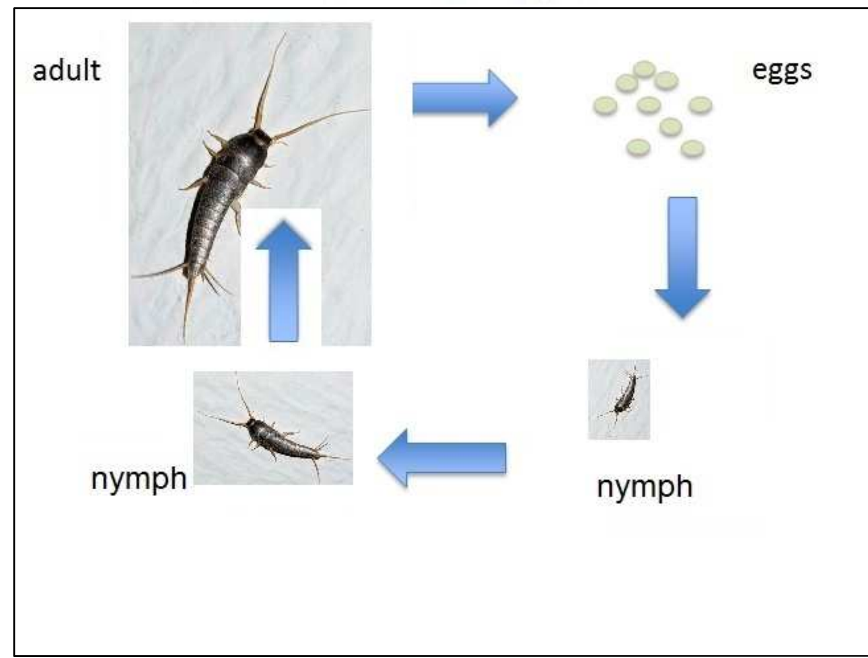
Order Thysanura

Silverfish and firebrats are wingless, even as adults. The body is carrot-shaped, with a long tapered tail with three filaments. The body is covered with more or less silvery scales which are easily rubbed off. 6 legs, the antennae and tail filaments long, slender and many segmented. Body length up to 20 mm.

Adult silverfish and firebrats



The life cycle has three stages, egg, nymph and adult. There are no larvae, the nymphs are like small adults but are not sexually mature.



Grey silverfish - *Ctenolepisma longicaudata*

Identification: adult
Shape: body carrot shaped, tapered behind, and flattened.

Colour; uniform silvery grey, scaled.

Antennae: antennae and tail filaments very long and slender.

Other characters: obvious bristles at sides of body.

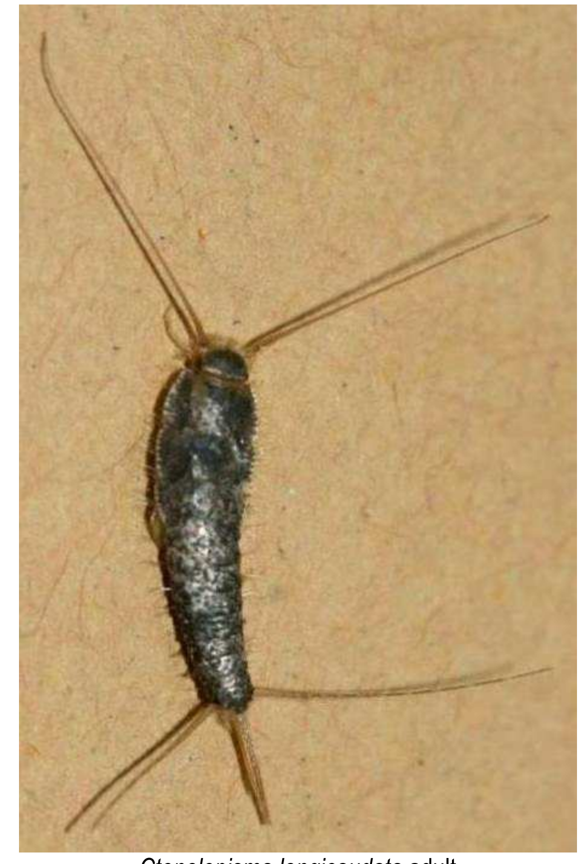
Body length, adults up to 20 mm. Contracting on traps as the body dries out.

Lepisma saccharina has shorter antennae and tail filaments, no bristles at the sides of the body, and is generally smaller.

Identification: nymph
Nymphs are like adults but smaller.

Signs of damage
Ctenolepisma longicaudata feeds by surface abrasion and will eat a wide range of starchy food, including breakfast cereal, damp papers, glues, textiles, specimen labels and also dead insects. Signs of infestation: surface damage and eventually holes. Tolerant of lower humidity and so can range further than *Lepisma saccharina*.

Status
A cosmopolitan pest species recently established in Britain (2014) distribution rapidly expanding.



Ctenolepisma longicaudata adult

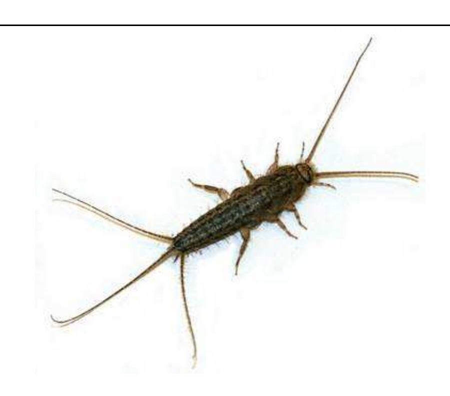


Ctenolepisma longicaudata adults and nymphs on sticky trap.

Four-lined silverfish -
Ctenolepisma lineata

Has four longitudinal dark stripes along the body.

Only found once in UK, a potentially pest



Silverfish - *Lepisma saccharina*
Other name: Fishmoth

Identification: adult
Shape: body carrot shaped, tapered behind, and flattened.

Colour; uniform silvery grey, scaled.

Antennae: antennae and tail filaments long and slender.

Other characters: without obvious bristles at the sides of the body.

Body length, adults up to 15 mm. Contracting on traps as the body dries out.


Lepisma saccharina adult

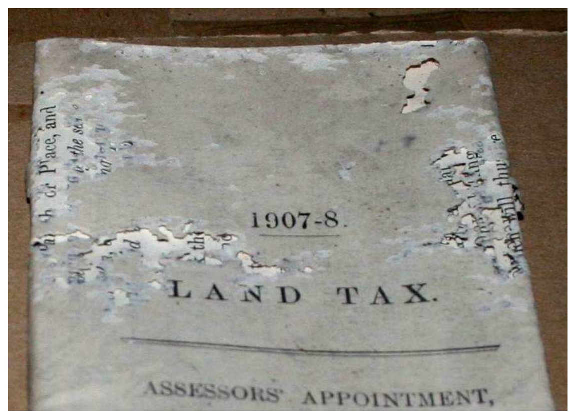
Compared to *Ctenolepisma longicaudata, Lepisma saccharina* has shorter antennae and tail filaments, no lateral bristles on the body, and smaller maximum size.


Identification: nymph
Nymphs are just like adults but smaller.

Signs of damage
Lepisma saccharina feeds by surface abrasion and will eat a wide range of starch food, including damp papers, glues, textiles, specimen labels and also dead insects. Silverfish require localised humidity of >75% to breed so can be used as an environmental indicator.


Lepisma saccharina adults and various sized nymphs

Status
A very common established pest in domestic and commercial buildings in Britain.



Lepisma saccharina feeding damage on archival paper


Lepisma saccharina on sticky trap

Firebrat - *Thermobia domestica*

Identification: adult

Shape: body carrot shaped, tapered behind, and flattened.

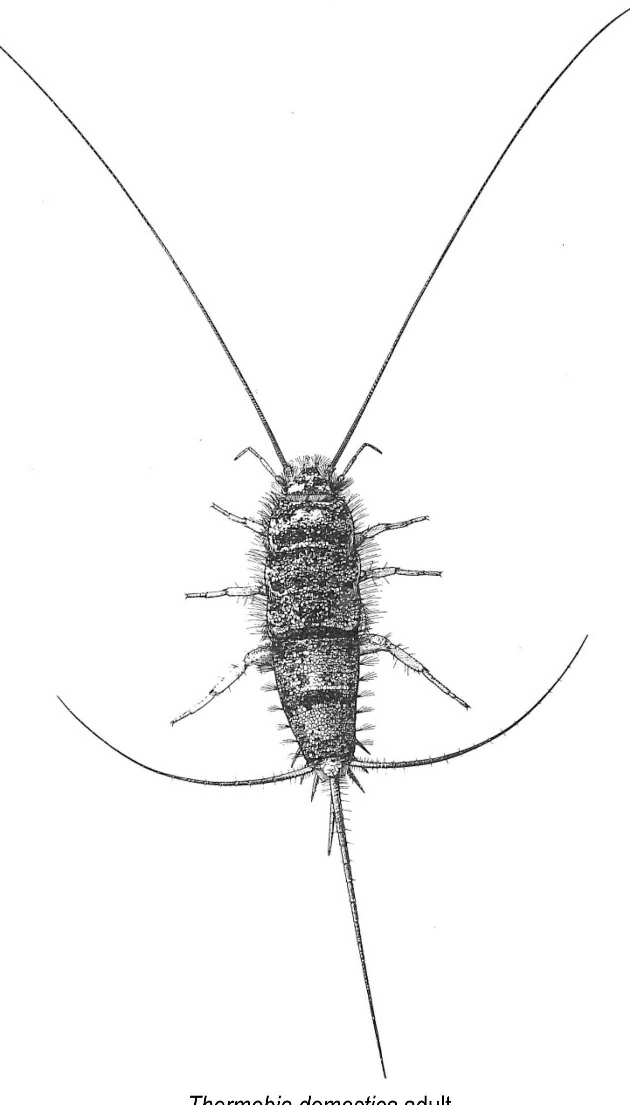
Colour; yellowish with conspicuous dark bands/mottling due to covering of scales.

Antennae: antennae and tail filaments very long and slender.

Other characters: with obvious bristles at the sides of the body.

Body length, adults up to 15 mm. Contracting on traps as the body dries out.

The colour will distinguish it from *Lepisma saccharina* and *Ctenolepisma longicaudata* which are both uniform grey, and the bristly body from *Lepisma* which is less obviously bristly. The dark bands go across the body unlike *Ctenolepisma lineata* which has dark lines along the body.



Thermobia domestica adult

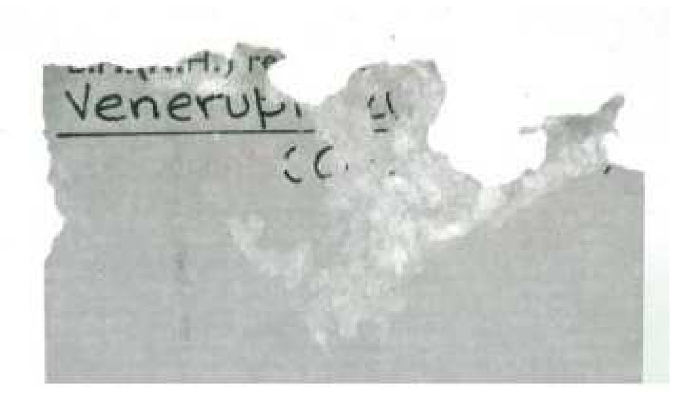
Identification: nymph

Nymphs are just like adults but smaller.

Signs of damage

Firebrats feed by surface abrasion and will eat a wide range of starchy food, including damp papers, glues, textiles, specimen labels and also dead insects.

Firebrats require high temperatures and some humidity to breed and can be used as an environmental indicator.



Thermobia domestica damage to paper specimen label

Status

An occasionally established pest in kitchens and bakeries, but less common than *Lepisma* due to its requirement for higher temperatures.

Other pests




Oriental cockroach - *Blatta orientalis*

Very dark brown, almost black, forewings not quite reaching tip of the body behind (male) or small pads (female).
Body length, adults 17-30 mm.
Life cycle: eggs in egg capsule, nymph, adult. Living indoors, requiring warmth and localised high humidity.

Significance: indicator of poor cleanliness in areas where food is prepared/ stored/ consumed/ disposed. Also feeds in latrines and can transmit diseases.

Female (left), male (right).




German cockroach - *Blattella germanica*

Smaller than *Blatta orientalis*, straw coloured, thorax with two stripes, adults fully winged.
Body length, adults 10-15 mm.
Life cycle: eggs in egg capsule, nymph, adult. Living indoors, requiring warmth and localised high humidity.

Significance: indicator of poor cleanliness in areas where food is prepared/ stored/ consumed/ disposed. Also feeds in latrines and can transmit diseases.



American cockroach - *Periplaneta americana*

Larger than *Blatta orientalis*, reddish brown, thorax brown with pale margin, adults fully winged.
Body length, adults 28-44 mm.
Life cycle: eggs in egg capsule, nymph, adult. Living indoors, requiring warmth and localised high humidity.

Significance: indicator of poor cleanliness in areas where food is prepared/ stored/ consumed/ disposed. Also feeds in latrines and can transmit diseases.

Black garden ant - *Lasius niger*



Diagnosis: black fast moving, black/dark brown ant, most are wingless workers. Reproductives – queens and males – are winged. The queen shedding her wings soon after mating.
Body length: worker 3.5-5 mm; queen 8-9 mm; male 3.5-5 mm.
Life cycle: egg, larva, pupa, adult, forming persistent colonies with queen (reproductive female), workers (non-reproductive female) and males. Usually living outside or in basements but can forage into buildings.

Significance: indicator of poor cleanliness in areas where food is prepared/ stored/ consumed/ disposed. Can transmit diseases. Does not sting but can squirt formic acid which causes a burning sensation.



Pharaoh's ant - *Monomorium pharaonis*





Diagnosis: slow moving, tiny wingless, pale yellow coloured ant. most are wingless workers. Reproductives – queens and males – are darker coloured and winged. The queen shedding her wings soon after mating.
Body length, workers 2 mm; queens 3.6-4.8 mm; males 3.0 mm.
Life cycle: egg, larva, pupa, adult, forming persistent colonies. Frequently in heated buildings feeding on fatty and sugary substances including all kinds of food, carrion dead insects.

Significance: Indicator of poor cleanliness in areas where food is prepared/stored/consumed/disposed. Can transmit disease. Can bite and sting.

Worker (above) queen (below).

Vinegar flies - *Drosophila* spp.



Diagnosis: Small, two wings, brown/ black, some species with red eyes.
Body length 2-3 mm.
Life cycle: larvae in decaying fruit or other organic waste, kitchens/ latrines.

Significance: indicator of poor cleanliness in areas where food is prepared/ stored/ disposed and in latrines so can transmit disease.

Other insects and arthropods found in traps

These are not pests but may live in, or enter buildings. They may indicate poor environmental conditions, particularly damp, or poor building proofing and should be removed so that they do not provide food for pests.

Millipedes – class Diplopoda



Diagnosis: Long cylindrical animals with no wings many short legs, two pairs of leg per segment, slow moving. Body length up to 40 mm.

Life cycle: eggs, nymphs, adults, living in soil and rotting vegetation.

Significance: Always live outdoors, so if on traps indicate poor proofing.

Centipedes – class Chilopoda



Diagnosis: Long flattened animals with no wings and many legs, one pairs of leg per segment, fast moving predators. Body length up to 40 mm.

Life cycle: egg, nymph, adult, living outdoors.

Significance: Always live outdoors, so if on traps indicate poor proofing.

Pseudoscorpions e.g. Book scorpion - *Chelifer cancroides*



Diagnosis: small brown flattened, no wings, with pair of pincers like a scorpion (but no sting!). Body length up to 2 mm.

Life cycle: eggs, nymphs, adults, living as predators of small insects.

Significance: Most pseudoscorpions live outdoors but *Chelifer cancroides* live in houses as a predator of booklice, indicating a pest problem with high levels of booklice.

Spiders – order Araneae



Diagnosis: no wings, eight legs and body in two parts, legs usually long. Body length up to 15 mm (excluding legs).

Life cycle: eggs, nymphs and adults, living as predators of other insects, some trap prey in webs, others are active hunters.

Significance: Some spiders can live indoors if there are sufficient insects for them to eat, indicating housekeeping/pest control are inadequate. Other spiders may enter from outside especially in autumn, indicating poor building proofing.

Woodlice – order Isopoda



Diagnosis: flattened oval body covered in grey, mottled armoured segments, no wings, and 14 legs.
Body length up to 10 mm.

Life cycle: egg nymph, adults, living in damp rotting wood and leaf litter.

Significance: Usually live outdoors, so large numbers on traps indicate poor proofing or damp conditions inside buildings e.g. basements/round window frames.

Springtails – order Collembola



Diagnosis: Cylindrical, wingless, grey/mottled, long forked tail used for jumping. Body length up to 3 mm.

Life cycle: egg, nymph (like small adults) and adult. In damp places feeding on mould/detritus.

Significance: Environmental indicator of localised high humidity.

Barklice – order Psocoptera



Diagnosis: Small insects similar to Booklice, but with fully developed wings. Body length up to 2 mm.

Life cycle: egg, nymph, adult, living outdoors in leaf litter, damp wood.

Significance: Usually live outdoors, so large numbers on traps indicate poor proofing or damp conditions inside buildings e.g. basements/round window frames.



Thrips or thunder bugs – order Thysanoptera

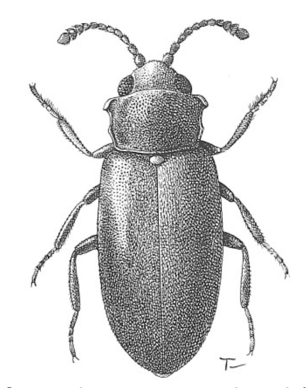


Diagnosis: very tiny thin insects, usually black, with short antennae and a short tube at the rear. Body length up to 1 mm.

Life cycle: egg, nymph, non-feeding nymph, adult, feeding on fungi and plants.

Significance: Usually outdoors, some cereal infesting species are very common and in warm humid weather form large swarms which enter buildings. Large numbers on traps indicate poor proofing. Can creep inside picture frames and stain pictures.
.

Fungus beetles – family Cryptophagidae e.g. *Cryptophagus acutangulus*





Cryptophagus acutangulus adult and larvae of close relative *Cryptophagus lycoperdi.*

Diagnosis: small light brown beetles, antenna with a loose club. Side of thorax with angled projections.
Body length up to 2 mm.

Life cycle: egg, larvae, pupae, adult, feeding on mould.

Significance: in damp areas, new plaster, condensation on window frames, leaking pipes, sinks – environmental indicators of damp - check for leaks, condensation etc.!

Plaster beetles – family Latridiidae (genera *Adistemia, Cartodere, Corticaria & Dienerella*)

Diagnosis: small light brown beetles, antenna with a loose club, thorax slender, and wing-cases grooved. Body length up to 2 mm.

Life cycle: egg, larvae, pupae, adult, feeding on mould.

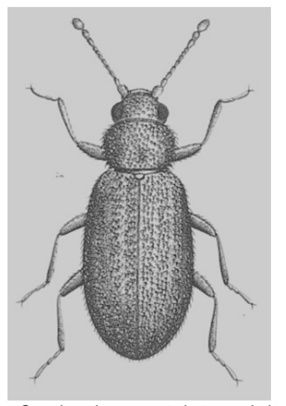
Significance: associated with damp areas, new plaster, condensation on window frames, leaking pipes, sinks – these species are environmental indicators of damp conditions - check for leaks, condensation etc.!



Adistemia watsoni adult, underside



Dienerella filum adult, *Dienerella filum* larvae



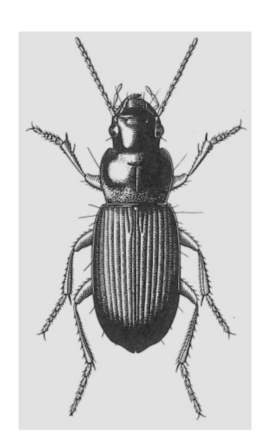
. *Corticaria punctulata, adult*

Ground beetles – family Carabidae

Diagnosis: a diverse family of active predatory beetles, with prominent jaws and long antennae, black, brown or metallic. Body length up to 25 mm.

Life cycle: egg, larva, pupa, adult, larvae and adults are predatory.

Significance: live outdoors, so large numbers on traps indicate poor proofing.



Clover weevils – *Sitona* spp.

Diagnosis: brown or green beetles with a short snout and elbowed antennae. Body length up to 5 mm.

Life cycle: egg, larva, pupa, adult, both larva and adult feed on legumes.

Significance: Always live on plants outdoors, so large numbers on traps indicate poor proofing.



Click beetles – family Elateridae



Diagnosis: elongate black or brown beetles, helmet shaped thorax and lined wing cases. Adults are able to jump by clicking their thorax back suddenly. Body length up to 15 mm.

Life cycle: egg, larva, pupa, adult, larvae live outside feeding on plants, in soil, compost, rotten wood, and so.

Significance: the adults are intruders. Large numbers on traps indicate poor proofing.



Rove beetles – family Staphylinidae



Diagnosis: black brown, reddish, elongate beetles, the short wing cases do not cover the hind body and give these beetles an earwig-like appearance. Body length up to 25 mm.

Life cycle: egg, larva, pupa, adult, both larva and adult are predators or scavengers.

Significance: Always live outdoors, so if found on traps indicate poor proofing.

Mealworm beetles – family Tenebrionidae



Diagnosis: black elongate slow moving beetles. Body length up to 15 mm.

Life cycle: egg, larva, pupa, adult, both larva and adult feed on vegetable materials and stored products.

Significance: often occur in bird nests so can indicate an environmental problem in buildings - tie to clean out chimneys, gutters and roof spaces.

Ladybird beetles – family Coccinellidae

Diagnosis: black red white yellow more or less spotted rounded beetles. Body length up to 7 mm.

Life cycle: egg, larva, pupa, adult, both larva and adult are predators.

Significance: Live outdoors, some enter buildings to hibernate, esp. Harlequin ladybird *Harmonia axyridis*. If found on traps indicate poor proofing. Toxins from *Harmonia* may cause allergic reaction.



Harmonia axyridis, adults various colour forms

Moths – order Lepidoptera

Diagnosis: four large scaly wings. Body length up to 40 mm.

Life cycle: egg, larva, pupa and adult, mostly larva live outside as they eat plants.

Significance: Live outdoors, but sometimes entering buildings, especially if attracted to light. If found on traps indicate poor proofing. Most moths (except the pest species above) are not pests, all pest moths are small, so larger moths are not pests.



Cluster fly – *Pollenia rudis*

Diagnosis: medium-sized grey fly with two wings. Body length up to 10 mm.

Life cycle: egg, larva, pupa and adult, larva live outside and are predators of earthworms, adult.

Significance: Live outdoors, but entering buildings in autumn to hibernate, especially attics, sometimes in vast numbers, indicating poor proofing. May cause staining at roosting sites.

Pictures shows adult fly and accumulated dead flies on window sill, a fine meal for a carpet beetle!



Lacewings – order Neuroptera



Diagnosis: delicate insects with four large lacy wings, green or brown. Body length up to 15 mm.

Life cycle: egg, larva, pupa and adult, larva live outside and are useful predators e.g. of aphids.

Significance: Live outdoors, but entering buildings, especially attics, in autumn to hibernate, so large numbers on traps indicate poor proofing.

A parasitic wasp - *Laelius pedatus*



Tiny black wasp, four wings, wasp waist. Body length: 3 mm. Life cycle: egg, larva, pupae, adult, parasitic on the larvae of carpet beetles.

Significance: Environmental indicator of high/persistent populations of carpet beetle larvae.

Other species may be found which are parasites of *Anobium punctatum.* Also some outdoor species may occasionally enter from outside.

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